

REMARKS

The present invention relates to a storing and/or transferring method of a polyalkylene glycol monomer.

In the Office Action of January 26, 2005, claims 1-8 were rejected, although, apparently inadvertently, it was stated at the top of page 2 that claims 1-7 are rejected and pending. First, claims 1-8 were rejected under 35 U.S.C. § 102(b) based on Hirata et al (EP 0 989 109). Furthermore, claims 1-8 were rejected under 35 U.S.C. § 103(a) based on Knebel et al (USP 6,040,473) in view of Hirata et al (EP 0 989 109), and claims 1-3, 5, and 8 were rejected under 35 U.S.C. § 103(a) based on the Aldrich Catalog 1998-1999 (pages 1365 and 1368).

Applicants respectfully submit that in view of the amended claims herein, and particularly considering amended independent claim 1, the present Amendment clearly differentiates the present invention *vis-à-vis* the cited prior art, and places remaining claims 1, 2, 4, 6, and 8-12 in condition for immediate allowance. Therefore, entry of the Amendment and allowance of the application are respectfully requested.

In this Amendment, subject matter from claim 3 is incorporated into claim 1, and accordingly claim 3 has been cancelled. Furthermore, the amended recitation -- a polyalkylene glycol ether monomer-- in claim 1 finds support in "Production Example 1" at pages 29-30 of

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the specification. Above new claims 9 and 10 find support at page 6, line 14-22 and at page 9, line 34 to page 10, line 15 of the specification, respectively.

Therefore, these amendments do not introduce new matter, and are appropriate for entry.

With respect to the rejection of claims 1-8 under 35 U.S.C. 102 (b) as being anticipated by Hirata et al. (EP 0 989 109), the Examiner indicated that Hirata et al discloses 80 % aqueous solution of polyethylene glycol methacrylic ester in example 4, etc.

In response herein, Applicants have amended claim 1 to further specify -- a polyalkylene glycol ether monomer--. A polyalkylene glycol ether monomer is not disclosed in Hirata et al.

Therefore, amended claim 1 is clearly novel over Hirata et al.

In view of the Examiner's indication that the reflux condenser of Hirata et al falls within the meaning of Applicants' storage vessel, Applicants have added new claim 9 herein.

In new claim 9, the storage vessel and the transfer vessel is specified as capable of maintaining a tightly closed state during storage and/or transfer. Any form of reflux condenser having an opening to air and a reflux condenser does not fall within the meaning of a vessel capable of maintaining a tightly closed state during storage and/or transfer.

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With respect to the rejection of claims 1-8 under 35 U.S.C. 103 (a) as being unpatentable over Knebel et al. (6,040,473) in view of Hirata et al.(EP 0 989 109), Applicants note that Knebel teaches the synthesis of methoxypolymethylene glycol methacrylate in Example I and III and synthesis of methacrylic acid ester of a C16-C18 fatty alcohol ethoxylate in Example II.

All of them are polyalkylene glycol ester compounds.

On the other hand, Applicants have amended claim 1 to specify -- a polyalkylene glycol ether monomer --.

The following discussion indicated the differences of synthesis of a polyalkylene glycol ether compound and that of a polyalkylene glycol ester compound.

polyalkylene glycol ester compound

When ester is produced by esterification of unsaturated carboxylic acid such as (meth)acrylic acid and polyalkylene glycol such as methoxy polyethylene glycol, esterification is carried out by using a dehydrating solvent in order to remove water which generates during the reaction. After esterification, water is added in order to remove dehydrating solvent. Thereby, ester is obtained and water remains in the reaction vessel after the reaction. An esterification reaction is described on page 36 of the present specification.

polyalkylene glycol ether compound

When alkylene oxide adduct of unsaturated alcohol such as 3-methyl-3-buten-1-ol is produced by addition reaction of alkylene oxide to unsaturated alcohol, reaction is carried out without using solvent. Therefore, water in order to remove dehydrating solvent is not necessary, and the reaction product is obtained without dehydrating solvent or water. The reaction product, alkylene oxide adduct of unsaturated alcohol, is not easy to handle, because alkylene oxide adduct of unsaturated alcohol, which is polyalkylene glycol ether compound, easily solidifies when it is cooled and is deteriorated when heating to melt is repeated.

Therefore, some measure to avoid deterioration of the product is necessary.

Synthesis of polyalkylene glycol ether monomer is described in "Production Example 1" on page 29-30 of the present specification.

As explained above, synthesis of a polyalkylene glycol ester compound and that of a polyalkylene glycol ether compound is quite different and a polyalkylene glycol ester compound is obtained in aqueous solution when the esterification reaction is completed.

Thus, even when Knebel et al. discloses methoxypolymethylene glycol methacrylate or methacrylic acid ester of a C16-C18 fatty alcohol ethoxylate in the aqueous solution after the synthesis, it is not the same as a polyalkylene glycol ether compound in the aqueous solution.

The storing and/or transferring method of the present invention is more suitably used for the production of a polyalkylene glycol ether monomer rather than the production of a polyalkylene glycol ester monomer, because the polyalkylene glycol ether compound is easier to solidify than the polyalkylene glycol ester compound.

Knebel fails to disclose the aqueous solution of polyalkylene glycol ether monomer. Rather, Knebel teaches the synthesis of methoxypolymethylene glycol methacrylate in Example I and III and it is described that the reaction product possesses a color number of 20, according to APHA in the form of 50% aqueous solution. However, it is also described that methoxypolyethylene glycol-750-methacrylate, which is the reaction product, solidifies into a wax-like mass at room temperature.

Thus, some measure to keep the reaction product in an aqueous solution state is required in order to store/transfer the product in the form of aqueous solution. However, Knebel only discloses that the reaction product was obtained in the liquid state by the reaction carried out at high temperature and does not disclose anything about storing or transferring of the reaction product. Therefore, the present invention is not obvious to one having ordinary skill in the art from the description of Knebel et al. in view of Hirata et al.

The present invention is achieved by optimization of the form of polyalkylene glycol ether monomers during store and/or transfer, and shows superior results and unexpected advantages as compared to the prior art such that it becomes possible to prevent polymerization, hydrolysis and/or thermal decomposition.

Knebel et al neither discloses nor indicates the storing and/or transferring of the reaction product.

Therefore, the subject matter of the presently claimed invention would not have been obvious to the person with an ordinary skill in the art.

With respect to new claim 10, the present specification describes on page 6, lines 14-22 that it is preferable to adjust the concentration of water in the aqueous solution so that the solution may flow at ordinary temperature (20°C). Also, it is described that the pour point of the aqueous solution of the polyalkylene glycol monomer becomes higher as the number m increases. Thus, to keep aqueous solution of the polyalkylene glycol monomer flowing at ordinary temperature, the concentration of water in the aqueous solution should be increased as the number m increases, as described on page 9, line 34 to page 10, line 15 of the specification.

Therefore, it is preferable that the concentration of water in the aqueous solution is adjusted depending on number of oxyalkylene group in the polyalkylene glycol monomer so that

the solution may flow at 20°C, and this is not obvious to a person of ordinary skill in the art from the description of Knebel et al in view of Hirata et al.

Therefore, Applicants' subject matter of new claim 10 would not have been obvious to a person of ordinary skill in the art over Knebel et al in view of Hirata et al.

With respect to the rejection of claims 1-3, 5 and 8 under 35 U.S.C. 103 (a) as being unpatentable over the Aldrich Catalog 1998-1999(pages 1365 and 1368), the Aldrich Catalog discloses "Poly(ethylene glycol) biphenyl ether methacrylate, 50wt. % solution in methacrylic acid/water[125441-87-4] $\text{H}_2\text{C}=\text{C}(\text{CH}_3)\text{CO}_2(\text{CH}_2\text{CH}_2\text{O})_n(\text{CH}_3)_{21}\text{CH}_3$... contains ca. 25% methacrylic acid 25% H_2O ..." on page 1365, and "Poly(ethylene glycol) 2,4,6-tris(1-phenyl ethyl)phenyl ether methacrylate, 60wt. % solution in methacrylic acid/water $\text{H}_2\text{C}=\text{C}(\text{CH}_3)\text{CO}_2(\text{CH}_2\text{CH}_2\text{O})_n\text{C}_6\text{H}_2[\text{CH}(\text{CH}_3)\text{C}_6\text{H}_5]_3$... contains ca. 20% water and 20% methacrylic acid ..." on page 1368.

The Aldrich catalog discloses only polyalkylene glycol ester compounds. As was noted above, an esterification product is obtained in the aqueous solution state. Therefore, one of ordinary skill in the art would not reach the present invention, which is the storing and/or transferring method of polyalkylene glycol ether monomer, and which is not obtained in the aqueous solution state from the Aldrich Catalog, which merely discloses aqueous solution of polyalkylene glycol ester compound obtained as an aqueous solution state.

Also, both of above products in the Aldrich Catalog contain methacrylic acid in high proportion. Therefore, removal of methacrylic acid may be necessary when it is used. On the other hand, the aqueous solution of polyalkylene glycol ether monomer obtained by the storing and/or transferring method of the present invention mainly contains polyalkylene glycol ether monomer and water.

Thus, the present invention has unexpected advantages in this point also.

Therefore, the subject matter of present claim 1 would not have been obvious to a person of ordinary skill in the art.

In the Aldrich Catalog, nothing is mentioned about “n” in the general formulae and the catalog just discloses the composition comprising polyalkylene glycol methacrylate, methacrylic acid and water in the ratio of 50%, 25%, 25% or 60%, 20%, 20%, respectively. Thus, the Aldrich Catalog, like Knebel et al, fails to disclose the relation between concentration of water in the aqueous solution and the number of oxyalkylene groups in the polyalkylene glycol monomer.

The present inventors have found that it is preferable to adjust the concentration of water in the aqueous solution for the aqueous solution of the polyalkylene glycol monomer to enable flow at ordinary temperature and it is not obvious to one of ordinary skill in the art from the Aldrich Catalog, which simply discloses the composition comprising polyalkylene glycol

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methacrylate, methacrylic acid and water in the ratio of 50%, 25%, 25% or 60%, 20%, 20%, respectively.

Therefore, the subject matter of new claim 10 would not have been obvious to a person of ordinary skill in the art over the Aldrich Catalog.

Accordingly, the Examiner's contention that the present claims 1-8 are unpatentable over Hirata et al (EP 0 989 109), Knebel et al (6,040,473), or the Aldrich Catalog 1998-1999(pages 1365 and 1368) is untenable, and is respectfully traversed.

Accordingly, entry of this Amendment and allowance of claims 1, 2, 4, 6, and 8-12 is respectfully requested.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the local Washington, D.C. telephone number listed below.

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Respectfully submitted,

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Date: **May 26, 2005**